THERMAL STABILITY OF HYDROGEN SULFATE PROTIC IONIC LIQUIDS

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Ionic liquids are promising solvents for many industrially significant processes, including the separation of aromatic and aliphatic hydrocarbons, extractive desulfurization of petroleum products, and biomass processing. In addition, ionic liquids containing the hydrogen sulfate anion are considered superacidic catalysts for a number of reactions such as alkylation of aromatic compounds. Unlike most traditional solvents and catalysts, ionic liquids are thought to be environmentally benign. Processes in which ionic liquids may potentially be applied are often associated with the use of high temperatures. In this regard, the studies of the thermal stability of ionic liquids become a critical issue.

In this work, the thermal stability of a series of hydrogen sulfate protic ionic liquids with cations based on mono-, di-, and trialkylammonium was investigated. The thermal stability was studied using thermogravimetric analysis (TGA) in dynamic mode and FT-IR spectroscopy. Particular attention was paid to long-term thermal stability, which more accurately reflects the real operational properties of ionic liquids. Differential scanning calorimetry (DSC) was used to determine the melting temperature. Based on the obtained data, the operating temperature ranges in which the studied ionic liquids can be used as solvents were determined. The upper operating limit was defined as the temperature at which signs of chemical degradation were observed in the IR spectrum.

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